Occupational safety from a behavioural perspective

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Abstract

The present report is a literature study for the Dutch Ministry of Social Affairs and Employment in the context of its policy programme "Improving Occupational Safety." The main goal of the study is to provide the programme management with more information on culture and awareness in relation to occupational safety. Its additional goal is to produce input for a checklist that the programme management may use to assess specific Safety Improvement Projects.

The report elaborates two key notions. The first refers to the many influences on a person's behaviour. Based on the notion that any act is the result of multiple determinants, a cascade-like framework is presented that sorts insights on influences on behaviour into a logical order. The framework combines perceptual and rational processes internal to the person with social, organizational, and distal processes (i.e. long-term causes). It opens the way to look at influences on behaviour from a top-down and a bottom-up perspective. The framework shows that the various influences on behaviour have their own pace and that these differences in pace are particularly relevant for the proper diagnosis of present influences and for the design of an intervention. The framework also makes clear that the effectiveness of interventions will increase if all the influences on a particular behaviour point in the same direction.

The second key notion refers to culture. From an evolutionary perspective culture can be seen as a set of socially coordinated practices that have been selected in the course of time, because they contributed to the success of the group in question. Notably, the main elements of culture are not the practices as such but the ways they are coordinated, for example by making trade-offs.

According to this line of thought, safety culture refers to care about the safety of each practice and care about safety at the level of coordination. The overall goal is to get control over variations of work-related processes. In a company, the main levels of coordination are (1) the macro-organizational level of management practices, (2) the micro-organizational level of supervision and group processes, and (3) the individual level of on the one hand rational decision-making and on the other hand immediate perceptions.

The role of safety should be examined at each of these levels. Moreover, this can be done in a prescriptive (normative) or a descriptive way. Although the two approaches may be related and even overlap, it is important to avoid misunderstandings by keeping them apart.

The report describes that a thorough approach to improve safety culture and safety awareness should, ideally, start with a comprehensive diagnosis to characterise the current position of the company involved. Based on the diagnosis and the type of company, an appropriate intervention can be chosen together with a plan to evaluate the results. The role of the government may be to facilitate certain steps in the process. The aim of the diagnosis is to specify the differences between current practices and desired practices. For each of the relevant levels of coordination, there are specific diagnostic instruments, such as safety audits, safety climate interviews, attitude questionnaires and behavioural observations. The type of intervention depends on the level at which

changes are called for (see Table A). An important point in planning interventions is to keep an eye on the congruency of the various influences on behaviour. The effectiveness of interventions will increase if all the influences on a particular behaviour point in the same direction.

Table A. Interventions for each level.

Relevant levels	Feasible interventions
Macro organizational culture (e.g. processes taking years to decades)	Design and implementation of management systems, change of incentives
Micro organizational culture (e.g. processes taking days to months)	Dialogue, supervisory monitoring, training, feedback
Individual – rational level (e.g. processes taking minutes to hours)	Campaigning, training, feedback
Individual – perceptual level (e.g. processes taking fractions of seconds)	Ergonomics improvement, training, feedback

Finally, it is noted that experiences with the introduction of environmental management plans have shown that it is not easy for government agencies to stimulate companies in making changes, even if that seems to be in their own interest. The bottleneck is a lack of strategic focus and management commitment. In view of this, it is emphasized that the government has more than one instrument at its disposal to influence the behaviour of a target group.

Samenvatting

Dit rapport bevat de resultaten van een literatuurstudie die is uitgevoerd voor het ministerie van Sociale Zaken en Werkgelegenheid ten behoeve van het programma "Versterking arbeidsveiligheid in Nederland." Het belangrijkste doel van de studie is de programmamanagers te informeren over de invloed van veiligheidscultuur en veiligheidsbewustzijn op arbeidsveiligheid. Een nevendoel is input te leveren voor een checklist die de programmamanagers kunnen gebruiken bij het beoordelen van veiligheidsverbeteringstrajecten.

Het rapport bouwt voort op twee basisinzichten. Het eerste betreft het feit dat het gedrag van iemand door vele factoren wordt beïnvloed. Op basis van het idee dat elk gedrag het resultaat is van multipele determinanten, wordt een raamwerk gepresenteerd waarin de verschillende invloeden op gedrag logisch worden geordend. Dit raamwerk combineert processen op de niveaus van directe waarneming en rationeel bedoeld gedrag met sociale en organisatorische processen, alsmede ontwikkelingen op de lange termijn.

Het raamwerk biedt de mogelijkheid om de invloeden op gedrag zowel "van bovenaf" als "van onderop" te bezien. Het laat zien dat de verschillende invloeden op gedrag elk hun eigen snelheid hebben en dat deze snelheidsverschillen van belang zijn voor de juiste diagnose van bestaande invloeden en voor het ontwerp van interventies. Voorts kan het raamwerk verduidelijken dat de effectiviteit van interventies toeneemt naarmate meer invloeden op gedrag dezelfde richting uitgaan.

Het tweede basisinzicht betreft cultuur. Vanuit een evolutionair gezichtspunt kan gesteld worden dat cultuur betrekking heeft op een verzameling sociaal gecoördineerde praktijken die in de loop van de geschiedenis zijn geselecteerd, omdat ze bijdroegen tot het succes van de mensen in kwestie. Hierbij moet benadrukt worden dat het niet zozeer de afzonderlijke praktijken zijn die het bijzondere van een cultuur vormen, maar de manieren waarop ze worden gecoördineerd. Een eenvoudig voorbeeld is dat praktijken tegen elkaar worden afgewogen en dat de een meer prioriteit krijgt dan de ander.

Op basis van dit inzicht geldt dat veiligheidscultuur betrekking heeft op de zorg voor de veiligheid van elke praktijk afzonderlijk en de zorg voor veiligheid op het niveau van de coördinatie. Het algemene doel is dat variaties op de aan werk gerelateerde processen onder controle worden gebracht. In een bedrijf zijn de belangrijkste niveaus van coördinatie achtereenvolgens (1) het macro-organisatorische niveau van het management, (2) het micro-organisatorische niveau van supervisie en groepsprocessen, en (3) het individuele niveau van psychologische processen, waarbij nog een onderscheid mogelijk is tussen enerzijds het niveau van rationeel bedoelde beslissingen en anderzijds het niveau van directe waarneming.

Van belang is dat de rol van veiligheid op al deze niveaus bekeken wordt. Dit kan gebeuren vanuit een prescriptieve (normatieve) of een descriptieve invalshoek. Hoewel de beide invalshoeken samenhangen en elkaar kunnen overlappen, verdient het aanbeveling misverstanden te voorkomen door ze nadrukkelijk uit elkaar te houden.

In het rapport wordt aangegeven dat een verantwoorde aanpak om de veiligheidscultuur en het veiligheidsbewustzijn te verbeteren in het ideale geval zou beginnen met een zo

volledig mogelijke diagnose van de bestaande situatie in een bedrijf. Op basis van deze diagnose en het type bedrijf kan dan een passende interventie worden gekozen in combinatie met een plan voor de evaluatie ervan. Hierbij kan de overheid een ondersteunende rol spelen. De diagnose dient het verschil te specificeren tussen de huidige praktijk en de gewenste praktijk. Voor elk van de onderscheiden niveaus van coördinatie worden hiervoor specifieke instrumenten genoemd zoals audits betreffende veiligheidsbeleid, interviews over het veiligheidsklimaat, attitudevragenlijsten en observaties van gedrag. Het type interventie hangt af van het niveau waarop veranderingen worden gewenst (zie tabel A). Een belangrijk aandachtspunt bij het plannen van interventies is de congruentie van de invloeden op gedrag. De effectiviteit van interventies zal toenemen als alle invloeden op een bepaald gedrag in dezelfde richting wijzen.

Tabel A. Interventies per niveau van coördinatie.

Relevante niveaus	Bijbehorende interventies
Macro-organisatorische niveau (processen van jaren tot decaden)	Ontwerp en implementatie van management systemen, verandering van "incentives"
Micro organisatorische niveau (processen van dagen tot maanden)	Dialoog, supervisie en toezicht, training, feedback
Individueel – rationeel niveau (processen van minuten tot uren)	Campagnevoering, training, feedback
Individueel – perceptueel niveau (processen die fracties van seconden vergen)	Ergonomische verbeteringen, training, feedback

Tot besluit wordt opgemerkt dat de ervaringen met het introduceren van milieuzorgsystemen hebben uitgewezen dat het voor overheden niet gemakkelijk is om bedrijven tot veranderingen te prikkelen, ook als die in hun eigen belang lijken te zijn. De kern van het probleem is vaak een gebrek aan concrete plannen en "commitment" van het management. Daarom wordt benadrukt dat de overheid meer dan één instrument tot haar beschikking heeft om het gedrag van een doelgroep te beïnvloeden.

1. Introduction

The Ministry of Social Affairs and Employment aims to improve the organizational and behavioural aspects of occupational safety in the Netherlands. This aim has been laid down in the Programme "Improving Occupational Safety". Its primary objective is a significant reduction of the number of accidents affecting employees in the selected industries and target groups. This reduction should be in the order of 10 to 15%. The main measures to reach the objective are:

- Improving safety awareness in selected industries and target groups through specific Safety Improvement Projects tailored to the culture of these industries and target groups.
- Developing a quantitative risk model and associated database to support decision making about the specific measures required to reduce risks in these industries and target groups.

The present study refers to the first item. It involves a literature study to provide the programme management with more information on culture and awareness in relation to occupational safety. Its additional goal is to produce input for a checklist that can be used by the programme management to assess specific Safety Improvement Projects.

Main questions

Given the objective of the Programme, it is necessary to assess:

1. Whether (and under what conditions) it is feasible to claim significant differences between working practices (or management practices) that are more preferable and less preferable from a safety perspective.
2. Whether (and how) this can be done in a way that makes it attractive for managers and employees to select for the safety promoting practices and select against the other ones.
3. What the government may do to stimulate safety promoting working practices.

The emphasis in this report is on questions 2 and 3, as much has already been written in the literature about unsafe acts that are the result of deficiencies in management and organization. The general idea is that a thorough approach to improve safety culture and safety awareness should start with a comprehensive diagnosis to characterise the current position of the company involved. Based on the diagnosis and the type of company, an appropriate intervention can be chosen together with a plan to evaluate the results. The role of the government may be to facilitate certain steps in the process.

This approach requires more insight into the potential role of safety awareness and safety culture as causes of behaviour. We address these topics by using a general framework of influences on behaviour, mainly derived from social psychology. In considering its operational consequences, we draw on insights from various behavioural disciplines and take due account of experiences with government support for plans to improve a company's environmental management.

Organization of the report

The first part of the report provides insight into the potential role of safety awareness and safety culture as causes of behaviour. The latter parts are focused on the operational consequences. The chapters are organized as follows.

Chapter 2 presents a cascade-like framework that is meant to sort insights on influences on behaviour into a logical order. The framework can be used from a top-down and a bottom-up perspective.

From a top-down perspective, Chapter 3 focuses on health and safety as personal values and puts them in the context of other values that can be important in people's life.

From a bottom-up perspective, Chapter 4 explains two important distinctions made in the literature about awareness, namely with regard to the level and the focus of awareness.

Chapter 5 considers the consequences of these insights for the topics of safety culture and safety awareness at three levels, namely the macro organizational, micro organizational and individual level.

Chapter 6 examines diagnoses and interventions in relation to the framework presented in Chapter 2 and the behaviour-oriented literature on occupational safety. It also presents some lessons from experiences with government support for plans to improve a company's environmental management.

Chapter 7 draws conclusions for the checklist.

2. Framework to order influences on behaviour

The purpose of this chapter is to sort insights on factors that influence behaviour into a logical order. For that purpose we use two general notions. The first one is that it makes sense to consider, from a behavioural perspective, the time it takes to create or develop something. For example, a real problem cannot be solved in one second and a friendship cannot be built in an hour. The second notion is that any potentially causal factor can only cause an effect in a certain context. In other words, a virus can only cause an illness among those persons who are not immune to it. And this context, in turn, is dependent on other causal factors, such as the special vulnerability that is determined by heredity. The best approach to combine the two notions is one that builds a cascade-like framework of the relevant processes in a logical order. That framework is the core of this chapter.

Multiple determinants

In considering the causes of a person's behaviour, it is important to take into account that any act is the result of multiple determinants. The most obvious determinants are the perceptual and rational processes that enable the person to adapt his or her behaviour to the situation at hand. For example, if an employee has noticed a warning signal he or she may need some time to confirm the warning and to find out what is happening. At that moment, however, the person's behaviour may also be influenced by strong loyalties to colleagues who should not be left alone in time of danger. Also relevant are the emergency practices developed by the company where the person is employed. In short, the behaviour in question is not only a function of processes within the person, but also of social and organizational processes that can work as "proximal" causes of behaviour.

Moving from processes that are internal and proximal (i.e. short-term causes) to more distal processes (i.e. long-term causes), we can see those determinants of behaviour that will not dramatically change during the lifetime of an individual. These relatively stable, distal processes can influence the behaviour of a person who is coping with a warning, for example, by highlighting certain beliefs about fortune and misfortune, which are part of broadly shared worldviews. Unlike mediaeval men and women, modern people will not expect solutions from magical powers but they may still be sensitive to some of these beliefs under conditions of uncertainty. Notably, the process of cultural modernization has taken almost a millennium to develop (Levine, 2001). On an even longer time scale, there are evolutionary processes that have shaped human capabilities to cope with various kinds of environmental danger, for example , by enabling them to make a hasty distinction between negative and positive stimuli.

Framework

The processes mentioned above can be arranged in a cascade-like framework that is shown in Figure 2.1. Its highest level refers to evolutionary processes. One of the results of the evolution is that humans are able to assess a difference between positive and negative stimuli in about 100 milliseconds (Smith, Cacioppo, Larsen et al., 2003). Another relevant feature with an evolutionary origin involves the response strength of brain sys-

tems. Brain systems responsible for evaluating negative stimuli respond more strongly than those responsible for evaluating positive stimuli (Smith et al., 2003). This so-called negativity bias means that negative stimuli (e.g. suspect noises) have a greater impact on information processing than positive stimuli do.

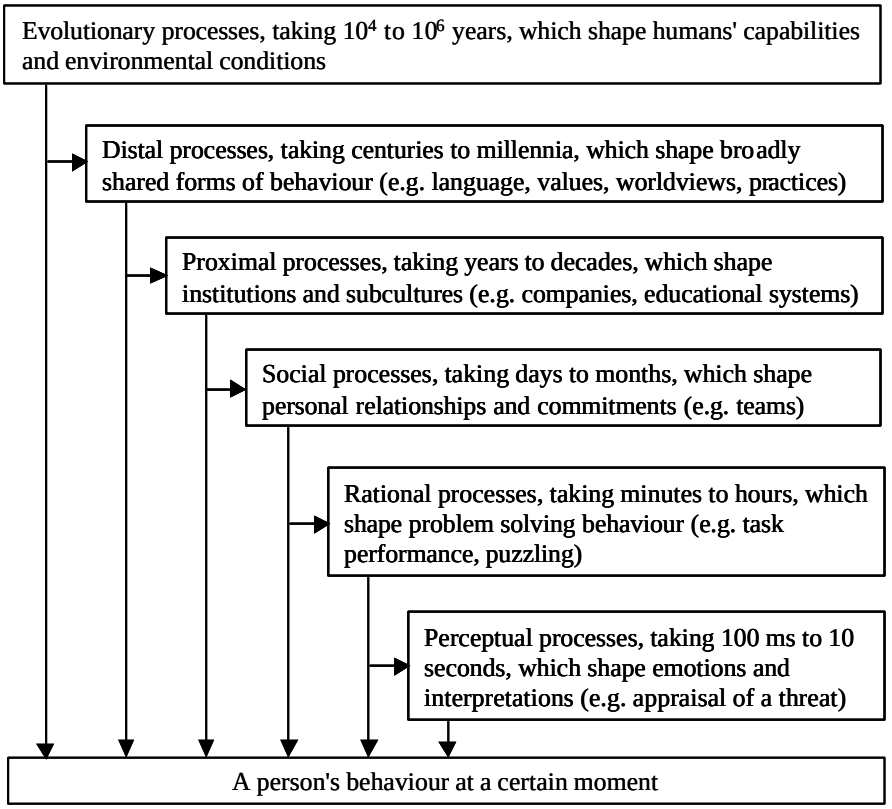

Figure 2.1 Cascade-like framework to order influences on behaviour.

Distal processes

The next level of Figure 2.1 refers to distal processes that have shaped broadly shared forms of behaviour in periods of centuries or millennia. This includes the rise of practices, values and worldviews that are typical of the modern culture in the Western part of the world. To put it simply, the "modern" period started in 1900 and modern Western societies can be distinguished from their predecessors by their potential democratisation of both their wealth and their political process (Levine, 2001: 11). The overall concept of modernization covers a number of more specific processes, such as the growing importance of an "engineering culture" characterized by the systemic application of scientific knowledge to societal issues (Carroll-Burke, 2001). The "engineering culture" produced the steam engine and many other things that account for the present welfare.

Proximal processes

By their very nature, distal processes like modernization have offered opportunities and constraints for the development of institutions and subcultures. These belong to the proximal processes of Figure 2.1, which include the development of educational systems and industrial companies. The professional behaviour of students and employees is

heavily dependent on occupational and organizational cultures. In terms of Schein (1992: 12) such a culture may be seen as a pattern of shared basic assumptions that a given group (or organization) has learned as it solved its problems of external adaptation and internal integration. This is in agreement with the more general notion of culture as a set of coordinated practices that creates incentives and disincentives for the behaviour of the people involved.

Social processes

The social processes in Figure 2.1 are more personal than the professional activities mentioned above and take much less time to develop. For example, a person's loyalty to a colleague may grow in a few days or months. According to Newell (1990: 494) it is characteristic of social situations that there are at least three types of goals. (1) Each person cares about the task the group is performing. (2) The person also cares about maintaining the social atmosphere of the group. (3) And each person cares about his or her own position in the group and the personal satisfactions of group membership. Regarding each of these goals, the person has an impact on the outcomes but he or she is also dependent on the other group members.

Rational processes

The processes mentioned above are external to the person, except for the social processes, which are a mixture of external and internal elements. The lowest levels of Figure 2.1 refer to processes that are internal to the person or that have been internalised. The rational processes, often taking minutes to hours, include conceptual learning, problem solving and decision-making. Notably, Figure 2.1 shows that the person's behaviour is not fully determined by rational processes. For example, even if the person aims to take a decision in a purely rational way, he or she will soon find out that on the one hand social commitments and on the other hand perceptual biases can interfere with such an approach as soon as the decision's consequences become serious.

Perceptual processes

Perceptual processes shape a person's rapid interpretations of a situation and the emotions that he or she experiences. An important distinction at this level is that between mindless and mindful processing. Psychological research has shown that people who are certainly capable of acting mindfully can perform seemingly complex tasks with little if any active mental involvement (Langer, 1989). This means, among other things, that they rely on routines developed in the past and that they do not make new distinctions to accommodate any changes of the task environment. This is typical for what Rasmussen called skill-based and rule-based behaviour (Rasmussen, 1987). In contrast, mindfulness is essentially awareness of contexts. Without this awareness, a person cannot improve his or her performance, self-esteem or health (Langer, 1989). We come back to this point later.

Relevance for diagnosis and intervention

The framework of Figure 2.1 is the result of an attempt to sort a wide range of behavioural phenomena into a logical order. Only purely biological processes at the level of organs and cells (e.g. taking microseconds) have been left aside. The framework is rela-

tively new, although similar ideas have been put forward by others (Diamond, 1999; Newell, 1990; Oyserman, Kemmelmeier, & Coon, 2002). A review of research and theory relating to these phenomena is obviously beyond the scope of this study. Without going into details, however, it is possible to highlight some relevant insights.

One of the notions behind the framework is that the more distal factors provide the context in which the more proximal or internal factors can have their effect. This notion is particularly relevant for the impact of culture on behaviour. For example, the process of modernization has enabled modern people to understand that disasters, such as floods, are not the result of magical forces, but natural phenomena that can be analysed in terms of causes and effects. Under these circumstances, people may become more sensitive to science-based advice on safety precautions.

An important practical message of Figure 2.1 is that it is not necessary (if feasible) to change a given culture in order to change a particular behaviour. The example of smoking shows how this can work. During the years 1910–1919, the American tobacco companies could rapidly increase the number of male smokers by using strong appeals to the culture of the American male (e.g. the Camel campaign); in later years they also developed special campaigns for women (Pierce & Gilpin, 1995). Since the mid-1960s, however, other dimensions of this same American culture have been used in attempts of the social/health movement to ban smoking. New evidence in 1986 that smoking was also life threatening for the people who shared the smoker's environment contributed to the successful moralization of smoking as behaviour that is unhealthy to others (Katz, 1997). In sum, the number of smokers could go up and go down without dramatic changes in the culture of the people involved.

The rise and fall of smoking shows that the achievement of specific policy objectives (e.g. selling cigarettes or promoting health) can be aided or hampered by appeals to well-chosen values of the broader culture. These appeals have also been effective in the workplace, where people were or were not allowed to smoke. Prohibitive rules and disapproval by colleagues have finally inhibited the behaviour of potential smokers. The example shows that the impacts of an organizational culture and social relationships at work may to a certain degree be in accordance with the broader culture. This congruence between various influences on behaviour is an important phenomenon.

The lower level processes of Figure 2.1 are a kind of building blocks for the higher ones. For example, a non-smoking policy in the workplace will not succeed if an employee can mindlessly light up a cigarette without any negative feedback (i.e. level of perceptual processes). The policy will also fail if the employee consciously tries to evade the rules (i.e. level of rational processes) or strives to transform the rules by organising protest meetings (i.e. level of social processes). The notion of building blocks does not mean, however, that an individual can fully understand how his or her behaviour contributes to social relationships, organizational cultures and long-term cultural changes.

The examples mentioned above, and various additional examples in later chapters, show that the effectiveness of interventions will increase if all the influences on a particular behaviour point in the same direction. The framework can help to get insight into the congruency of the various influences on behaviour.

The framework also helps to consider the role of time for diagnoses and interventions. The fact that the various influences on behaviour have their own pace has consequences for the diagnosis of present influences and for the design of an intervention. The pace of change will depend on the type of process to be changed. For example, it may take less time to increase the practical knowledge of employees than to improve the social atmosphere of their work group.

In conclusion, it appears that we have a framework with promising possibilities. It is based on very basic but extremely valuable notions of causal relations and it opens the way to look at influences on behaviour both from a top-down and a bottom-up perspective. We expect that these perspectives can fruitfully be used to diagnose the safety-aspects of a given occupational situation and to develop plans for improvement.

3. Top-down perspective: the role of personal values

A top-down approach to influences on behaviour should give a prominent place to the role of personal values in people's life. In this section, health and safety will be taken as examples of personal values. Interestingly, health and safety are words with a multidimensional but imprecise general meaning, which can be interpreted in a traditional or modern way. As a result of the process of modernization and the democratisation of wealth (see the previous section), health and safety have become symbols of valued states of mind that seem to imply more than just the absence of illness or injury. What these symbols currently mean can be understood better when we place them in the context of other values that can be important in people's life. Several of these values can aid to increase a person's awareness of health- and safety-related issues. Others, however, can hamper this process and contribute to avoidance reactions. The aim of this chapter is to make clear what the role of values can be.

Research into values

Values are defined as standards or criteria in terms of which people make evaluations (Rokeach, 1973). For example, any time a person has to make a choice between a traditional "heavy" tool and a modern "light" tool, he or she may show the belief that one of these options is personally preferable to the other. In general, a person's value system is his or her enduring organization of beliefs concerning preferable modes of conduct (e.g., "respect for tradition") or end-states of existence (e.g., "healthy") along a continuum of relative importance.

Values can be studied at several levels of the framework presented in Figure 2.1, depending on the kind of topics that are addressed. For example, sociologists are interested in values at the level of institutions. Ethnographic investigators tend to emphasize the relatively unique cultural meaning of the criteria that specific groups, such as macrobiotics, use in a given social context. In contrast, social psychologists are more oriented to the activities of ordinary individuals; they seek to identify evaluation criteria and value structures that can be applied to, for example, the workplace and that can also be generalised to a wider set of situations. The latter approach is chosen here.

From this perspective, it is possible to examine relationships between relatively abstract values, such as a general preference for "security", and more concrete values linked with a subset of situations, such as using "self-protection" as a choice criterion in the workplace. Research into consumer behaviour (Allen & Ng, 1999) indicates that values can have two kinds of impact on choices: a person's values can provide (1) motives for a product choice (e.g. why self-protection?) and (2) criteria that enable him or her to compare alternative products (e.g. which self-protection?). In other words, values are relevant at the level of rational choices and they increase the person's sensitivity for value-related cues at the level of perceptual processes.

A highly relevant research programme on values has been organised by Schwartz, who initiated a series of multinational studies on the values people find important in their lives (Schwartz, 1992; Schwartz & Sagie, 2000). To ensure that the surveys in the various countries were comparable, the populations sampled were teachers or students (i.e.

predominantly middle class samples). Their ratings of the importance of 56 values were analysed by looking for values that seem to associate well and values that express contradictions. Drawing on theory too, Schwartz (1992) came up with 10 main groups of values that can be arranged along two axes (see Figure 3.1). The adjacent regions in Figure 3.1 show compatible values that can be pursued simultaneously, while values in the opposing regions are difficult to combine.

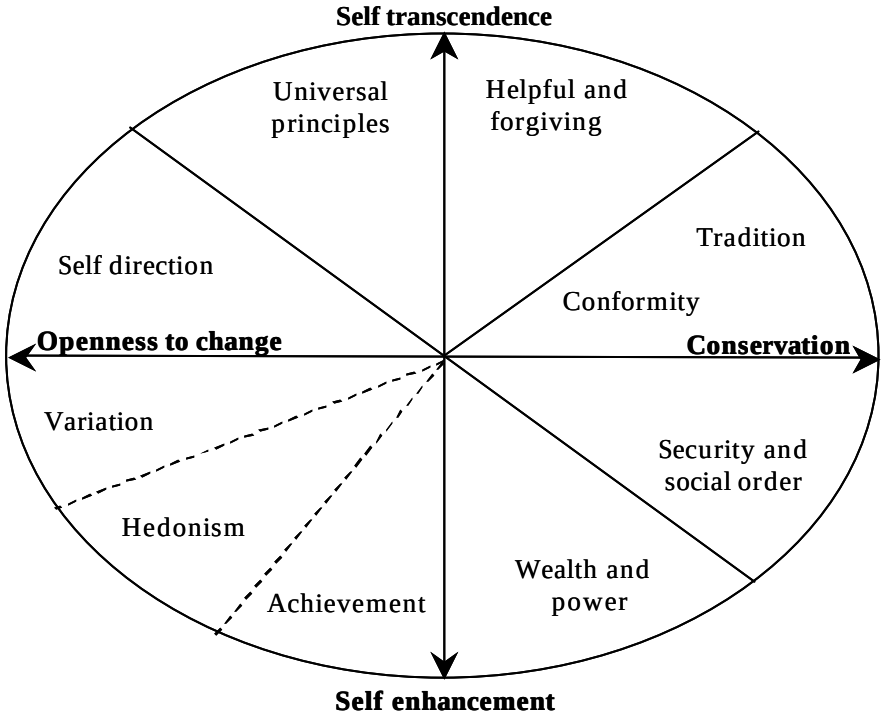

Figure 3.1 Main groups of values that people may or may not find important in their life, arranged along two axes (Adapted from Schwartz, 1992).

The horizontal axis of Figure 3.1 can be characterised by the dichotomy between being open to change versus being conservative. The openness to change relates to a number of values that go together well and are related to the desire to give one's life an independent character and with the importance attached to a varied life. In opposition to this is the priority given to tradition or security. On the vertical axis, "self enhancement" is opposed by "self transcendence". Self-enhancement has to do with values such as exercising power, achieving and enjoying oneself. Transcending oneself is expressed in the importance attached to being helpful and forgiving and in subscribing to universal principles – including protecting the welfare of all people and protecting nature.

One of the results of these multinational studies is the relationship between the value priorities of the samples and the main characteristics of the country in which they live (Schwartz et al., 2000). A comparison between countries has revealed that an increase in welfare and democratisation is accompanied by attaching more importance to openness to change ("variation", "self direction") and on values to do with transcending oneself ("universal principles"). Single values that indicate universalism include: "protecting the environment," "unity with nature," "a world of beauty," "social justice," and "equality" (Schwartz, 1992). These values seem very much related to the modern idea of sustain-

able development, which combines issues such as nature conservation, worker protection and fair-trade.

Health as a value

Another relevant point is the priority that people attach to "healthy" as a value in their life. The position of "healthy" is not displayed in Figure 3.1 because this value appeared to have multiple meanings that varied among different groups of people (Schwartz, 1992). The importance attached to "healthy" can be

- a goal of personal safety ("security" in terms of Figure 3.1);
- a goal of enjoyment of one's body ("hedonism");
- and of health maintenance through exercise (an "achievement" task).

Apparently, "healthy" serves various goals, depending on how it is interpreted. These multiple meanings are also relevant for any references to "health" in the context of workplace behaviour.

Safety as a value

The position of "safety" in the context of the other values is also somewhat complicated. Schwartz (1992) used the term "security" as a heading for personal goals of safety, harmony and stability with regard to one's society, one's relationships, and oneself. Accordingly, the term covers both family security and national security, although these may have dissimilar meanings for people from different countries. Nevertheless, it should be noted that the importance attached to "security" goals seems to go well together with "conformity" (e.g. honouring parents and elders) and "tradition" (e.g. respect for traditional culture).

The link between "security" and "conformity" has also been addressed from the perspective of personality research. While personal values are often considered learned adaptations to the environment, personality traits should be seen as styles of responding to the environment with a strong biological origin. Recent research (Olver & Mooradian, 2003) has indicated that personal values are influenced by the so-called Big Five personality traits (e.g. Extraversion, Neuroticism, Openness to Experience/Intellect, Agreeableness and Conscientiousness). In particular, the importance attached to "security" goals was higher among highly conscientious persons, a trait described with adjectives like truthful, organized, methodical and punctual. Conscientiousness also encompasses elements of conformity, impulse control and general risk aversion.

The impacts of personality traits on values and behaviour should not be overestimated, but they may be reinforced by childhood experiences and social relationships. Many authors (Green, 1997; Janis, 1962; Turner & Pidgeon, 1997; Wolfenstein, 1957) have emphasized that children learn to deal with the dangers of the external world mainly through mediation of parental protection. As a result, rules of safety and rules of obedience come to be strongly intertwined and this can have positive or negative consequences for precautionary behaviour in later life. As Wolfenstein (1957) notes, people who might be in danger should pay attention to the efficacy of precautions. If it is difficult to make an assessment of efficacy, however, their adherence of safety measures may show that they are reacting more to the enforcing authorities than to the real danger.

While obedience may lead to adherence, rebellion against the authorities may lead to outspoken refusal of the precautions (e.g., motor helmets) they have advised.

Relevance for diagnosis and intervention

The links between rules of safety and rules of obedience can have unwanted consequences for safety-related behaviour if negative social relationships and negative emotions are going to interfere with rational decision-making. To avoid this kind of sensitivities, several solutions have been proposed in the literature (Geller, 2001; Higgins, 1997; Langer, 1989; Weick, Sutcliffe, & Obstfeld, 1999). From a psychological point of view, it is important to develop more positive approaches to the introduction of safety-related behaviour and to define "safety" not only in terms of prevention of damage but also in terms of promotion of an achievement. An additional benefit of such an approach is that it may better go together with the relatively modern values of "achievement" or even "self-direction" (see Figure 3.1). The latter would be in agreement with the notion of a mindful professional who has a capacity for critical self-reflection on everything he or she does (Epstein, 1999).

In general, it is important to consider how people cope with values that may lead to conflicting consequences. One of the possibilities is that the person tries to balance the conflicting values in a series of choices (Dhar & Simonson, 1999). If the value of safety is considered the opposite of the value of self-direction, for example, the person may chose on the first occasion the option that is high on safety but low on self-direction and on the second occasion the option that is low on safety and high on self-direction. This is in fact a kind of risk-homeostasis, as it is known in the literature (Geller, 2001). To avoid this kind of conflicts, any intervention to improve safety should be developed and implemented in close co-operation with the people involved, in a way that fits to the value they attach to self-direction.

Finally, it should be noted that there are significant cultural differences between employees in the Netherlands at the moment. This means that some employees may value health and safety in a modern way, emphasizing their preference for self-direction, whereas others may endorse traditional values, emphasizing the link between safety and conformity. Obviously, such differences between preferences for self-direction and conformity can lead to serious safety problems if they are not properly managed.

4. Bottom-up perspective: the role of awareness

A bottom-up approach to the causes of behaviour takes processes at the perceptual level as its starting point. This is the level of awareness and interpretation, which are basic to the "fit" between person and environment. That people fit into their environment is often considered a precondition for their health and safety. It is also an ecologically inspired ideal that seems to be embodied in certain indigenous people who have successfully avoided natural hazards over the long term. Their awareness of the environment may be relevant for new conceptions of management, although their way of life should not be romanticized (Whiteman & Cooper, 2000). More general insights into the role of awareness for a person-environment "fit" have been provided by two recent psychological theories that will be discussed in this section.

Mindful of the environment

The ecologically inspired ideal of a person who fits into his or her environment may be characterized in terms of sensitivity and respect. For example, an indigenous beaver trapper in northern Quebec can be seen as an ecosystem manager whose sustainable practices are based on his sensitivity to the land and his respect for animals and natural forces (Whiteman et al., 2000). The trapper's notion that the ice should be respected is not only spiritually motivated but also driven by the pragmatic and experiential way in which he learns from the land. A highly comparable demonstration of sensitivity and respect can be found in a rather different environment, namely among the employees of High Reliability Organizations, such as the best nuclear power plants (Weick et al., 1999). Although the employees might not be equally motivated by spiritual beliefs as the trappers, they are just as mindful of unexpected changes in their environment and they show a comparably rich action repertoire in the pursuit of their goals.

Level of awareness

More insights into the characteristics of sensitivity and respect can be derived from two recent theories on respectively the level of awareness (Langer, 1989) and the focus of awareness (Higgins, 1997). Langer (1989) emphasises that the mindless way in which people frequently respond to their environment is not simply a matter of limited information processing necessary to allocate scarce attention to a more important issue that takes up their mind. People can also respond mindless when they don't have any important issue on their mind. Moreover, the difference is not just a matter of effort. Although it takes some effort to switch from mindless to mindful processing, the latter may not really require more effort. The main difference is that mindlessness refers to passive information processing with the expectation of no change in the environment, whereas mindfulness is active information processing with the expectation that something in the environment may change. Accordingly, it is essential for people like hunters and operators to be mindful, but this mental state may be advantageous to anyone who wants to make more of his or her life.

Focus of awareness

Higgins (1997) made another relevant distinction in his analysis of the different ways that people approach pleasure and avoid pain. His theory begins by considering what children learn about regulating pleasure and pain in the interaction with their parents. What they learn is different for the two survival needs of nurturance (e.g. nourishment) and security (e.g. protection). The differences are the following:

- Serving a nurturance need involves self-regulation with a promotion focus, sensitive to positive outcomes that may be gained (e.g. oriented to aspirations and accomplishments).
- Serving a security need involves self-regulation with a prevention focus, sensitive to negative outcomes that have to be avoided (e.g. oriented to fulfilling one's obligations and not making mistakes).

As a result of individual differences and momentary situations, a person may show either a promotion or a prevention focus at a given moment. With a promotion focus, the person will demonstrate eagerness to ensure the presence of positive outcomes and means of advancement; with a prevention focus he or she will show vigilance to ensure the absence of negative outcomes and mistakes (Higgins, 2000).

Relevance for diagnosis and intervention

The distinctions regarding the level and the focus of awareness are combined in Table 4.1. It should be emphasized that none of the four mental states is in principle better than the others. Dependent on the circumstances, each of the four can correspond with a particular "fit" between person and environment. There are no objections against mindless behaviour if it is certain that the environment will not change. If changes or even small variations are relevant, however, mindful processing is required. Accordingly, the beaver trappers mentioned above seem to demonstrate flexible eagerness, whereas the operators of the nuclear power plant show flexible vigilance.

Table 4.1 Mental states dependent on level of awareness (Langer, 1989) and focus of awareness (Higgins, 1997).

Focus of awareness	Level of awareness	
	Mindless (no change expected)	Mindful (environment may change)
Prevention (no loss – loss)	Passive reliance on obligations	Flexible vigilance
Promotion (gain – no gain)	Passive reliance on accomplishments	Flexible eagerness

The differences between the four mental states of Table 4.1 are particularly relevant for the effectiveness of interventions that should lead to a behavioural change. A persuasive message with weak arguments, such as a simple request, may have a temporary effect on a person's behaviour in the sense that he or she will do what has been asked for as long as it is indeed a simple request. In that case, the person is mindlessly fulfilling a series of obligations; such as letting other people go first. In contrast, a person who is mindfully processing a request will need strong arguments.

The difference between prevention and promotion may be complicated by differences between the situation in which the message is received and the situation in which the message should be practiced. Higgins (1997) notes that campaigns for condom use have naturally framed the message in terms of safe sex and the dangers to be avoided, which involve a prevention focus and anticipating losses. But at the critical moment when condoms will or will not be used, the partners are more likely to be in a promotion focus and anticipating gains. Thus, according to Higgins (1997), messages with a promotion focus on anticipated gains (e.g., condom use promotes a caring relationship) may be more effective in this case.

Because these insights are relatively new, it is not completely clear what they can mean for safety improvement. It seems logical to expect a direct relation between the level of awareness and risk perception. Moreover, a promotion focus makes other types of risk salient than a prevention focus. The type of job is also important. Being mindful of what might go wrong is a mental state that fits well into the behaviour of employees with a high degree of autonomy and a rich action repertoire in the pursuit of their goals. In contrast, employees who can do most of their tasks in a mindless way will find it difficult to switch from time to time to a more vigilant state. Although this problem is not unfamiliar, it may play a bigger role than current thinking suggests.

5. Consequences for safety culture and safety awareness

The previous chapters have provided general insights into matters of culture and awareness, based on a framework that enabled top-down and bottom-up perspectives on the factors that influence behaviour. In the following we will consider the consequences of these insights for the topics of safety culture and safety awareness. There is a substantial body of literature on these topics and it is not necessary to present here another review of previous research (e.g. Collins & Gadd, 2002; Cooper, 2000; Flin, Mearns, O'Connor et al., 2000; Glendon & Stanton, 2000; Guldenmund, 2000; Sorensen, 2002). However, it is often concluded that safety culture, in particular, is difficult to grasp. One of the reasons for this difficulty may be that the relevant terms are often used in two manners, namely in a descriptive and a prescriptive (or normative) way. Another reason might be that in the literature on safety culture almost no attention is paid to the phenomenon of culture. Therefore, we return to an earlier point and start with some remarks on the evolution of culture before we go into the other topics.

Culture

From an evolutionary perspective the notion of culture refers to socially coordinated practices that have been selected in the course of time, because they contributed to the success of the group in question. To put it simply, these coordinated practices range from the development of a language to the founding of a particular fabric. That the coordinated practices have been selected, at least temporarily, means that the people involved must have received incentives (instead of disincentives) when they behaved in certain ways. Whether they knew it or not, their behaviour was shaped by incentives that correspond with the values they are sensitive to, such as social belonging, safety, status, and wealth. Accordingly, someone who wants to understand a particular culture should find out which behaviours invoke incentives and which disincentives.

Given this general description of culture, it is possible to apply the notion of coordinated practices to any social group, including any professional organization. The framework presented in Chapter 2 is relevant here to make some further distinctions. Firstly, it is important to make a distinction between cultural changes that take place during the lifetime of an individual, and cultural changes with a long-term character. Focussing on the lifetime of an individual, three levels of the framework are relevant. These are:

- institutional processes of professional or organizational systems (e.g. related to the person's occupation and employer),
- the social processes of the team in which he or she works (e.g. colleagues or supervisors), and
- the psychological processes of the individual employee, who also has a particular way of life as a member of the broader culture.

In other words, one can look for safety influences at the macro organizational, micro organizational or individual level (e.g. Hofmann, Jacobs, & Landy, 1995). Notably, large organizations often consist of more levels than the three mentioned above. However, those levels, such as all kinds of middle management, are not really stable and are not basically different from the others. The notion that it makes sense to distinguish

processes depending on the time it takes to develop something works very well with respect to physical phenomena, such as molecules and atoms. In the social world, however, the notion of different processing levels is less clear-cut. Even the Chief Executive Officer of a large company is still a person who may, in principle, talk to anyone in the organization. Accordingly, our understanding of social phenomena will not improve if we just advance additional levels.

Safety culture

Processes at the macro organizational level have become particularly relevant following the Chernobyl accident. In its aftermath, the International Nuclear Safety Advisory Group (INSAG) introduced the term "safety culture" to denote the management and organization factors that are relevant to safe plant operation (Sorensen, 2002). The ambition of INSAG was to prescribe those features of organizations and individuals that give nuclear plant safety issues the attention warranted by their significance. This has been elaborated by the identification of lists of attributes as well as lists of questions that an organization might ask itself when the effectiveness of safety culture is to be judged in a particular situation. Assessment and self-assessment are considered tools that are of relevance for everyone whose attitude may influence nuclear safety, including the regulatory body (Murley, 1999; Murley, 2000).

Taking into account what has been said about culture, coordinated practices and incentives, the notion of safety culture in the nuclear industry can be specified as follows. The position of the arrows in Figure 5.1 shows that the impacts of prescriptions with regard to safety culture will depend on the balance of safety-related incentives and disincentives in the organization. If safety really gets an overriding priority compared to, for example, production, the prescribed safety culture will be selected for and competing practices will be selected against. Accordingly, it comes as no surprise that explicit commitment of management is often considered of great importance for an effective safety culture (Murley, 1999; Murley, 2000; Sorensen, 2002). Key to cultural changes, however, is not the position of management as such, but the way in which incentives and disincentives work.

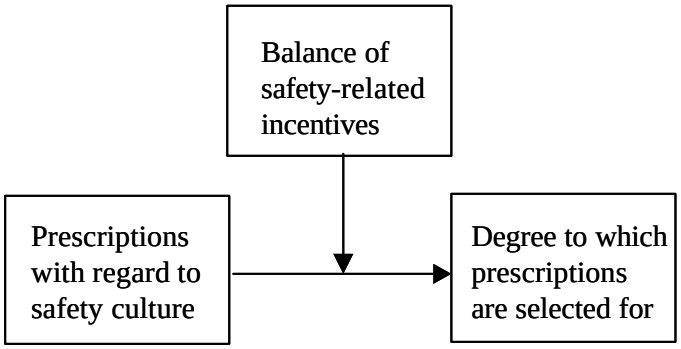

Figure 5.1 The balance of safety-related incentives and disincentives is a moderator variable for the degree to which prescriptions are selected for.

The degree to which prescriptions are selected will influence the safety performance of the organization. That influence is, however, dependent on other factors. The point is that organizations in safety critical domains are vulnerable to many kinds of potentially

harmful variations in their operations. Building on the schematic representation in Figure 5.1, Figure 5.2 adds the control over variations. The position of the arrows shows that the impacts of factors that generate variations will depend on the degree to which prescriptions with regard to safety culture are selected. Companies with a poor safety culture will show weak control over potentially harmful variations in their operations; those with a strong culture should be in control.

Whether these measures will finally result in strong safety performance is something that cannot be measured directly. Therefore, it is necessary to use indicators of strong or poor performance. As shown in Figure 5.2, both the degree to which prescriptions are selected for and the degree of control over variations may be used as indicators of performance. For example, a large number of employee grievances might indicate that the company has a low degree of control over variations and this might be an early sign of apparent safety problems (Murley, 1999).

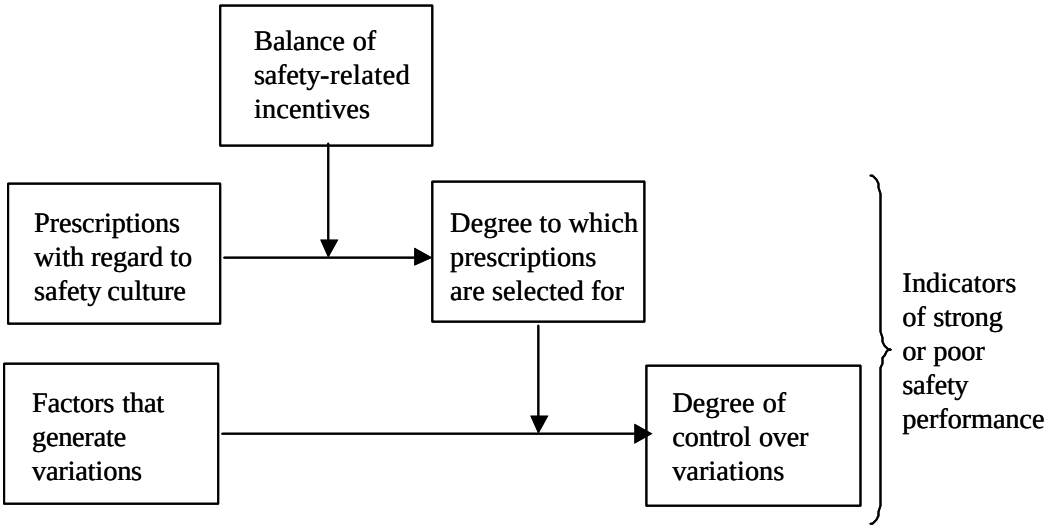

Figure 5.2 The degree to which prescriptions are selected for is a moderator variable for the degree to which variations are brought under control.

Although the use of indicators is quite legitimate from a methodological point of view, it is unfortunate that the mechanisms by which safety culture affects the safety of operations are not clear (Sorensen, 2002). As a consequence, it is also unknown how certain indicators should be situated in the causal processes that result in a particular performance. For example, the fact that the number of employee grievances is small may be a precondition for safe performance by these employees, but it may also be a concomitant of another variable such as management attention for safe operations. Being able to distinguish preconditions from concomitant variables is not only relevant from a scientific point of view. It will also concern companies that have to make a decision about those weaknesses of their culture they want to improve first.

The lists of attributes and questions developed for the nuclear industry (see Table 5.1 for an example) can in an adapted form be very valuable for other organizations. However, it is to be expected that organizations in safety critical domains will provide more safety-related incentives to their managers and employees than other organizations. In fact, one

of the problems for the latter may be that they provide other than safety-related incentives, which may not be changed easily.

Safety climate

At the micro organizational level of the team in which a person works there will also be prescriptions (i.e. to wear personal protection equipment), incentives, selection of prescriptions, and control over variations. Of particular importance at this levelare social rewards and perceived behaviour of other persons. Topics that can be relevant at this level are a group member's perceptions of (1) the task the group is performing, (2) the social atmosphere of the group, and (3) his or her own position in the group and the personal satisfactions of group membership. Much research at this level is focused on "safety climate", a term that is used for the perceptions of employees concerning safety policies, procedures, and practices including those of their supervisors (Flin et al., 2000; Glendon & Litherland, 2001; Hofmann, Morgeson, & Gerras, 2003; Neal, Griffin, & Hart, 2000; Parker, Baltes, Young et al., 2003; Zohar, 2000; Zohar, 2002; Zohar, 2003).

Research into safety climate is part of a broader field in which individuals' perceptions of their work environment are examined. The proper analysis of these perceptions can reveal significant differences between work groups or professional groups that belong to the same macro organizational culture. Nevertheless, it should be noted that research into perceptions might result in ambiguous results. On the one hand, perceptions may be wrong or biased. On the other hand, even if perceptions are wrong they may have an impact on the behaviour of the perceiver as long as the bias has not been corrected. For example, the members of a team might wrongly assume that all their colleagues expect an attitude of bravado from each other, whereas all of them personally dislike such an appearance (i.e. "pluralistic ignorance"). In such a case, an intervention (e.g., open group discussion) may help to disclose the real social norm of the team.

Safety awareness

At the individual level safety awareness can also be used in a prescriptive and a descriptive way. The prescriptive notion of safety awareness is part of safety culture and refers to attitudes and behaviours that show a strong concern with protecting and preserving the safety of the work environment. Several attitudes that may be a sign of weak safety culture are mentioned in Table 5.1 (e.g., "the hypnosis of excessive self-confidence"). Notably, the prescriptive notion of safety awareness cannot simply be assessed by self-reported questionnaires, because individuals are not always aware of what they are doing and why they do it. Observations and tests are more appropriate.

Table 5.1 Signs of potentially weak safety culture in nuclear plants (source: Murley, 1999).

Management
- lack of clear organizational commitment to safety;
- lack of management awareness and involvement in plant activities;
- lack of proactive approach to safety issues that arise;
- lack of nuclear experience among top managers;
- incomplete information reaching the top managers;
- not receptive to outside views – isolated;
- lack of depth in talented managers;
- unwilling to face difficult problems and correct them;
- lack of teamwork between functional organizations.

Programmes
- ineffective work planning and scheduling;
- ineffective corrective actions – recurring problems;
- cumbersome work control processes;
- quality assurance not an integral part of plant activities;
- training not an integral part of management planning;
- no formal program for analysing events including other plants.

Self-assessment
- outside organizations regularly find problems first;
- quality assurance audits are ineffective;
- superficial reviews by safety organizations;
- do not learn from the experience of others;
- management does not want to hear bad news;
- insufficient incident analysis – no experience feedback.

Accountability
- responsibility for fixing problems is not clearly assigned;
- schedules not established or routinely missed;
- decision-making is too slow;
- poor work performance is tolerated;
- ineffective internal inspection.

Regulatory relations
- management policy to dispute and defy the safety regulator;
- policy of minimal compliance with regulations;
- practice of delaying or deferring regulatory commitments.

Isolation
- little participation on standards or other committees;
- no exchange of personnel or information with other plants;
- no participation in technical conferences;
- no awareness of safety research advances.

Attitudes
- complacency;
- “the hypnosis of excessive self-confidence”;
- not receptive to outside suggestions;
- technical arrogance in relations with regulator;
- provincialism – no managers from outside;
- self-satisfaction with current performance – no need to look for problems.

Researchers who examine individuals' attitudes and behaviours in the context of safety climate often use self-reported questionnaires for a descriptive approach. Such an approach may also improve understanding of the role of environmental or situational factors in enabling and reinforcing self-protective behaviour in the workplace. It should be emphasized, however, that questionnaires are more appropriate to assess what a person consciously thinks about an activity than to measure what he or she is mindlessly doing in practice.

Final remarks

In the above section culture was defined as a set of socially coordinated practices that create incentives and disincentives for the behaviour of the people involved. According to this line of thought, safety culture refers to care about the safety of each practice and care about safety at the level of coordination. In a company, the main levels of coordination are the macro-organizational level of management practices, the micro-organizational level of supervision and group processes, and the individual level of on the one hand rational decision-making and on the other hand direct perceptions. The role of safety at these levels can be examined in a prescriptive and a descriptive way (see Figure 5.3). Although the two approaches may be related and even overlap, it is important to avoid misunderstandings by keeping them apart.

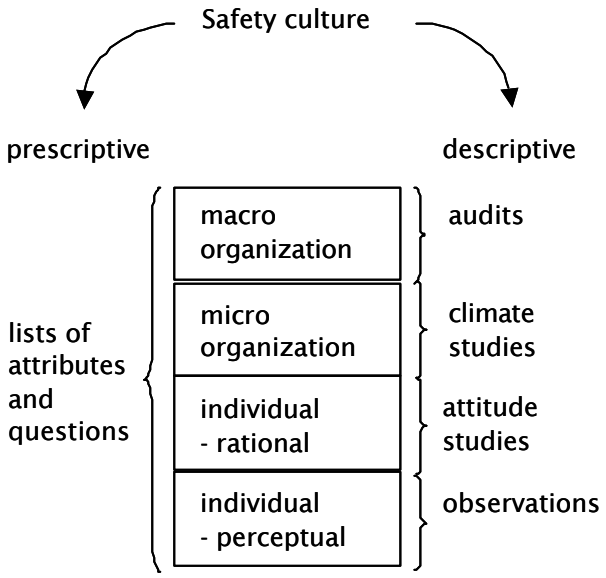

Figure 5.3 Safety culture can be assessed in a prescriptive or descriptive way.

6. Diagnoses and interventions

The analysis of Chapter 5 can help an organization to improve its safety culture and the safety awareness of its employees. Ideally, such a project should start with a comprehensive diagnosis to characterise the current position of the company involved. Based on the diagnosis and the type of company, an appropriate intervention can be chosen together with a plan to evaluate the results. In addition, the role of the government may be to facilitate certain steps in the process, if that appears to be necessary.

In practice, however, the situation is more complicated as there are many differences between the companies that may need improvement. Recent experiences with government support for plans to improve a company's environmental management can give valuable insights into the main complications. Therefore, we start with these experiences before we consider how diagnoses and interventions can be developed.

Differences between companies

Experiences with the introduction of environmental management plans have shown that there are two main differences between companies. These refer to (A) differences between large and small companies and (B) differences between sectors where environmental performance seems to play an important role in the public's perception (e.g., chemicals) and other sectors (Heida, 1996; Ministerie VROM, 1998; van Erven, 1991).

Large companies (i.e. more than 100 employees) are often used to pay attention to the management and continual improvement of processes. Moreover, companies that are under public pressure may take proactive steps that favour prevention rather than after-the-fact remediation. This confirms the notion that it is important whether the various influences on particular activities all point in the same direction.

Small companies (i.e. less than 100 employees) are less open to general suggestions on how working conditions may be improved. Their director, who is often also the owner, works under constant time pressure as a result of the many issues that compete with each other for his or her attention. Therefore, any plan for improvement of an issue that is not profit-related can only be realised if the director is able and willing to reserve, as long as that is necessary, a part of his time for the issue (i.e. possibly a number of years).

There is no general solution for the problem of how to stimulate small companies to improve their environmental or safety performance. A personal approach is often necessary (Bull, Riise, & Moen, 2002). Intermediaries, such as colleagues, may play a role. Pressure from customers and suppliers may also be important. For example, many small companies in a certain sector may buy their equipment from a small number of large companies. If those large companies can be stimulated to improve personal protection devices and safety equipment on machines, the small companies will gradually switch to newer and safer machines.

One of the strategic approaches that may be used is to distinguish types of companies in correspondence with their degree of progress. Whether this makes sense is an open question, however. Any process of change will show on the one hand pioneers or innovators and on the other hand laggards, as well as certain stages of change in between. In prac-

tice, many companies cannot be put into one of the categories, because making progress in one area may go together with lagging behind in another. Moreover, companies that are pioneers at a certain moment may fall back later, due to all kinds of circumstances.

Diagnosis

Although a thorough diagnosis of the current situation is desirable, it is not sensible to create additional burdens for companies by putting many demands on the diagnosis. The aim of the diagnosis is to specify the discrepancies between current practices and desired practices. It should take all the relevant levels into account, because processes at another level than the one that seems to evoke safety problems may aid in finding a solution. Accordingly, the framework presented in Chapter 2 and elaborated in Chapter 5 can be used to order the various diagnostic instruments (see Table 6.1).

Table 6.1 Diagnostic instruments for each level.

Relevant levels	Diagnostic instruments
Macro organizational culture (e.g. processes taking years to decades)	Audits, benchmarking, analysis of incentives.
Micro organizational culture (e.g. processes taking days to months)	Observations, focus groups, self-reported questionnaires.
Individual – rational level (e.g. processes taking minutes to hours)	Observations, interviews, self-reported questionnaires.
Individual – perceptual level (e.g. processes taking fractions of seconds)	Observations, tests, experiments.

Interventions

Given the discrepancies between current practices and desired practices an appropriate intervention has to be developed. The type of intervention depends on the level at which changes are called for (see Table 6.2). This has significant consequences for the pace of change. Another important point in planning interventions is to keep an eye on the congruency of the various influences on behaviour. As explained in Chapter 2 in relation to smoking, in Chapter 3 in relation to self-direction, and in Chapter 4 in relation to the focus of awareness, the effectiveness of interventions will increase if all the influences on a particular behaviour point in the same direction. Accordingly, it may be sensible to combine as much influences as possible.

Table 6.2 Interventions for each level.

Relevant levels	Feasible interventions
Macro organizational culture (e.g. processes taking years to decades)	Design and implementation of management systems, change of incentives
Micro organizational culture (e.g. processes taking days to months)	Dialogue, supervisory monitoring, training, feedback
Individual – rational level (e.g. processes taking minutes to hours)	Campaigning, training, feedback
Individual – perceptual level (e.g. processes taking fractions of seconds)	Ergonomics improvement, training, feedback

7. Conclusions for improvement plans

The previous chapters have discussed whether it is feasible to claim significant differences between working practices (or management practices) that are more preferable and less preferable from a safety perspective, and whether this can be done in a way that makes it attractive for managers and employees to select for the safety promoting practices and select against the other ones. The final question is what the government may do to stimulate safety promoting working practices.

Experiences with the introduction of environmental management plans have shown that it is not easy for government agencies to stimulate companies in making changes, even if that seems to be in their own interest. Moreover, it has been shown that promising instruments, such as a company's adoption of an Environmental Managing System, are not sufficient to improve environmental performance (Berkhout et al, 1999; Le Blansch, 1996). Apparently, the real bottleneck is not a lack of managing systems but a lack of strategic focus and management commitment.

In view of this, it should be emphasized that the government has more than one instrument at its disposal to influence the behaviour of a target group (see Table 7.1). The policy instruments involve communication, sometimes combined with command and control or with the exchange of money with the target group. The government's approach may be one-sided or it may enable the target group to engage in negotiations.

Table 7.1 Policy instruments to influence the behaviour of a target group (adapted from de Boer, Goosen, & Huitema, 2003).

	Mechanism to create behavioural change		
Policy approach	Purely communication	Also command and control	Additional exchange
One-sided imposition	Education	Rules	Subsidies or levies
Multilateral negotiation	Dialogue	Covenants	Tradable permits

The plan to use subsidies to support specific Safety Improvement Projects should be seen in the context of the other options in Table 7.1. This means that it would be premature to develop a checklist without considering how this list matches with a broader policy approach or the opinion of the target group. What can be provided in this stage of policy-making is a summary of relevant points, to be elaborated in a checklist later.

The main points to take into account in assessing the quality of improvement projects (apart from obvious points such as list of actions, person responsible, and assurance of adequate resources) are the issues of incentives and content.

Incentives-related points are:

- Management commitment (appreciation, time, implementing changes if needed).
- Involvement by workers (appreciation, understanding).
- Support from other relevant organizations (including customers and suppliers).

Content-related points are:

- Comprehensiveness of the diagnosis (all the influences on safe operations covered, no technological problems to be solved first).
- Clear view on difference between current practices and desired practices.
- Recognition of the time it takes to change the relevant influences on safe behaviour.
- Recognition of the importance of the congruency between the various influences on safe behaviours.
- In case of small companies, practically based approach.

Finally, it should be noted that the present discussion does not allow specific conclusions about practical lessons that may be drawn from the top-down and bottom-up analyses presented in the first part of this report. That would require a closer investigation of concrete cases, based on literature and fieldwork.

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